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(19)

(54) RAIL VEHICLE FOR TRANSPORTING HEAVY LOADS

(71) We, FRIED. KRUPP GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG, of 103 Altendorfer Strasse, D—4300 Essen, Federal Republic of Germany, a German Body Corporate, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a rail vehicle for transporting heavy loads of the kind comprising two bogies, a body disposed between the bogies and slides pivoted to the body and slidable in a lateral direction in guides on the bogies in response to travel of the vehicle in a curve.

The pivotal connections between the body and the slides constitute outer control points which serve for transfer of loads to the bogies from the body. In practice the slides are generally disposed at the centres of the bogies. In order to reduce, when traversing a curve, the resultant movement which may be considerable due to the length of the vehicle, inner control points have been provided. These inner control points are constituted by other articulated connections between the bogies and the body which are disposed between the slides and the centre of the body.

The invention provides a rail vehicle for transporting heavy loads comprising two bogies, a load supporting body disposed between the bogies, slides pivoted to the body and guided for substantially horizontal lateral movement in guides on the bogies in response to travel of the vehicle in a curve, stops on the bogies for limiting the lateral movement of the slides in both directions, and centering means on each bogie for imparting lateral centering forces to opposite sides of the body at a location between the associated slide and the centre of the body, the body being movable out of engagement with the centering means at one side of the body in response to increase in the curvature of the track in excess of that at which the stops become operative.

The centering forces may be applied to the body by springs or by pneumatic or hydro-pneumatic actuators.

Certain embodiments of rail vehicle according to the invention are illustrated schematically in the drawings, in which:—

Figs. 1*a* to 1*d* are plan views of the first embodiment, showing it in four different positions;

Fig. 2 is a corresponding side view;

Figs. 3 and 4 are plan views on a larger scale corresponding to Figs. 1*a* and 1*b* of a bogie in another embodiment of the vehicle;

Fig. 5 shows the bogie illustrated in Fig. 3 in the position assumed by the parts upon lateral displacement of the load; and

Fig. 6 is a plan view of a bogie in another embodiment of vehicle.

The vehicle shown in Figs. 1*a* to 1*d* and Fig. 2 includes a load-carrying body 2 carrying outriggers 1 which support the body on bogies 3 and 4. The outer ends of the outriggers 1, i.e. the ends remote from the body, are connected to respective bearing sockets 9, 10 disposed at the mid-points of slides 5 and 6, which are horizontally displaceable in guides 7 and 8 in the bogies 3 and 4. The centres of the sockets 9 and 10 constitute outer control points A. Pre-stressed springs 11 apply lateral centering forces to the outriggers 1 at inner control points I, which normally occupy central positions on the bogies. As the centering forces should desirably be equal to or greater than the maximum possible counter-force arising from canting due to rail camber, the pre-tension of the springs is adjustable. The springs 11 should also have a level characteristic.

Fig. 1*a* shows the position of the vehicle during straight travel; Figs. 1*b* to 1*d* show different positions assumed by the bogies in response to progressively increasing curvature of the track. It will be seen that in Fig. 1*b* the inner control points I have retained their central positions while the outer control points A have moved towards the outer side of the curve in the track. In Fig. 1*c* the outer control points A have reached outermost posi-

tions in which they have been arrested by stops 12 on the bogies. As will be seen from Fig. 1*d*, upon further increase in the curvature in the track the springs 11 at the inner side of the curve shorten and allow the control points I to move to the inner side of the curve while the outer control points A remain in their outer end positions. No action on the part of the crew during travel is therefore required. The springs 11 at the outer side of the curve are arrested by stops 13 in their most extended positions.

In the bogie 3 shown in Figs. 3—5 the springs 11 are replaced by pairs of hydro-pneumatic actuators, each consisting of an accumulator 15 and a hydraulic cylinder 16 connected thereto. The pistons of the cylinder are connected to eyes 17 on respective levers 18 which are pivoted at one end to the bogie. The stops 13 are not operative in the straight travel condition shown in Fig. 3. The lateral stops 20 for the slide 5 are adjustable.

Fig. 5 shows the maximum permissible lateral displacement of the load on the body during straight travel. This is accompanied by operation of a displacement device (not shown) to shift the slide 5 to move to a corresponding lateral position. Such lateral displacements can be effected during travel of the vehicle which is advantageous. After termination of the lateral displacement, the displacing device is disengaged from the slide, and the load is returned to its normal central position by the hydraulic cylinders 16.

The bogie 3 shown in Fig. 6 has a slide 5′ which is positioned in an arcuate guide 7′ and the levers 18′ have a common pivot 21. This has the advantage that, when the pivot 21 is suitably disposed, the movement of the inner control point I on the outrigger 1 with respect to the levers 18′ is extremely small. Naturally in practice there is not the line contact shown between the point I and the levers 18′ but a surface contact, e.g. by means of a sliding block.

WHAT WE CLAIM IS:—

1. A rail vehicle for transporting heavy loads comprising two bogies, a load supporting body disposed between the bogies, slides pivoted to the body and guided for substantially horizontal lateral movement in guides on the bogies in response to travel of the vehicle in a curve, stops on the bogies for limiting the lateral movement of the slides in both directions, and centering means on each bogie for imparting lateral centering forces to opposite sides of the body at a location between the associated slide and the centre of the body, the body being movable out of engagement with the centering means at one side of the body in response to increase in the curvature of the track in excess of that at which the stops become operative.

2. A vehicle according to claim 1, in which the lateral centering forces are applied to the body by springs.

3. A vehicle according to claim 1, in which the lateral centering forces are applied to the body by pneumatic or hydro-pneumatic actuators.

4. A vehicle according to any one of the preceding claims, in which the body carries outriggers projecting from its opposite ends, the slides being pivoted to the projecting ends of the outriggers and the centering means acting on the outriggers.

5. A vehicle according to any one of the preceding claims, in which the centering forces applied to the body are equal to or greater than the maximum possible counter-force arising from canting due to cambered rails.

6. A vehicle according to any one of the preceding claims, which include further stops which coact with the centering means when the body moves out of engagement with them.

7. A vehicle according to any one of the preceding claims, in which the stops for limiting lateral movement of the slides in the guides are adjustable.

8. A vehicle according to claim 1, substantially as described herein with reference to Figs. 1*a*—1*d* and 2 of the accompanying drawings.

9. A vehicle according to claim 1, substantially as described herein with reference to Figs. 3, 4 and 5 of the accompanying drawings.

10. A vehicle according to claim 1, substantially as described herein with reference to Fig. 6 of the accompanying drawings.

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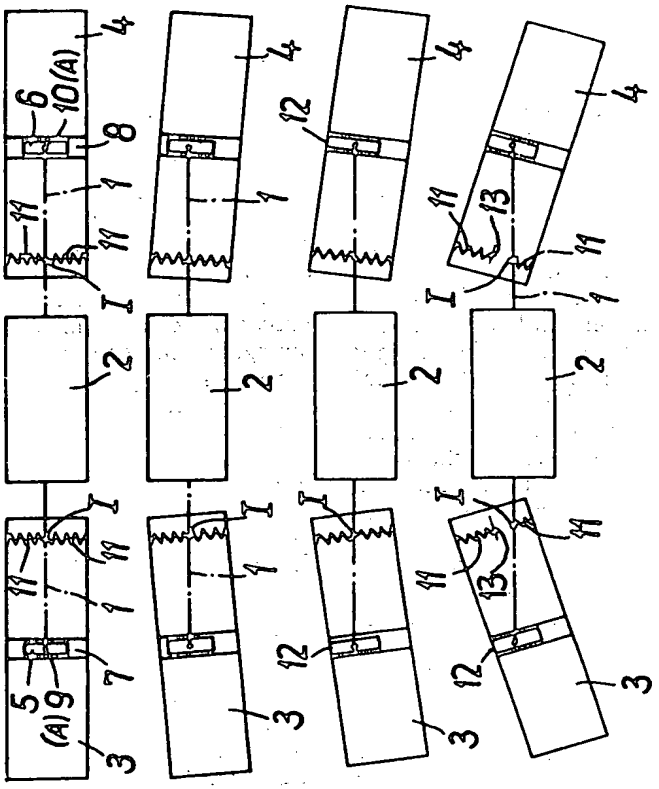

FIG. 1a FIG. 1b FIG. 1c FIG. 1d

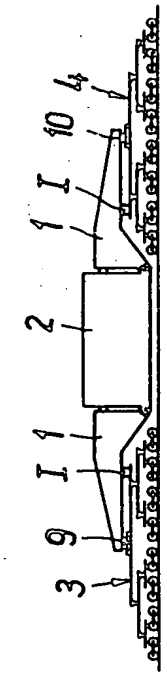

FIG. 2

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Sheet 2

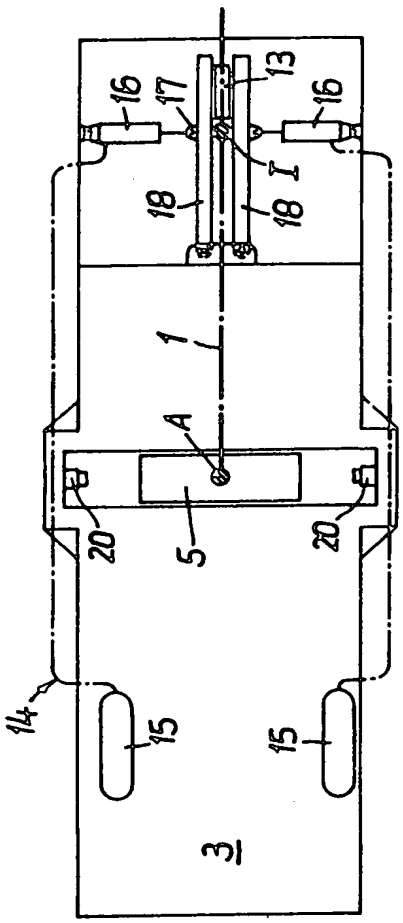


FIG. 3

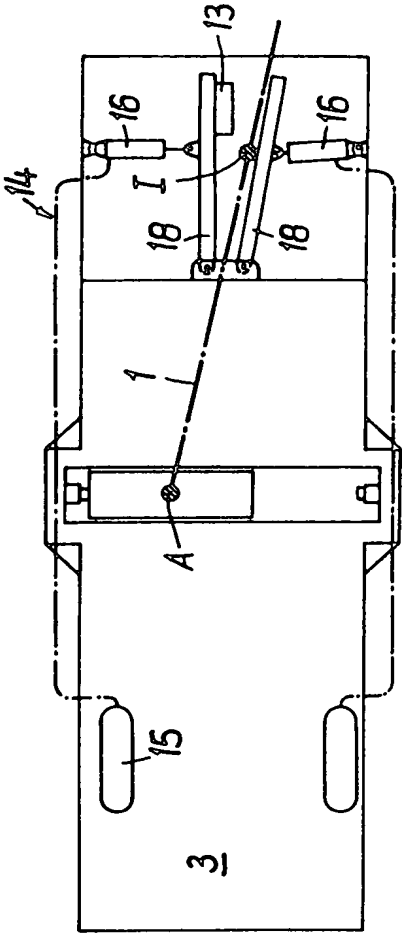
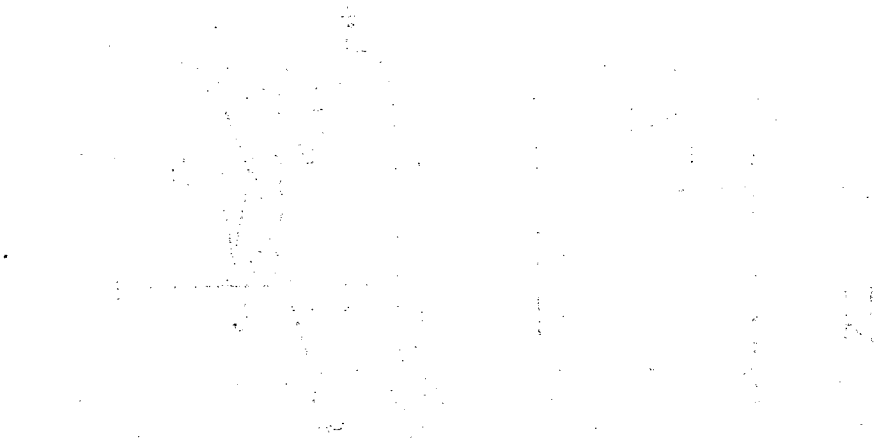


FIG. 4



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Sheet 3

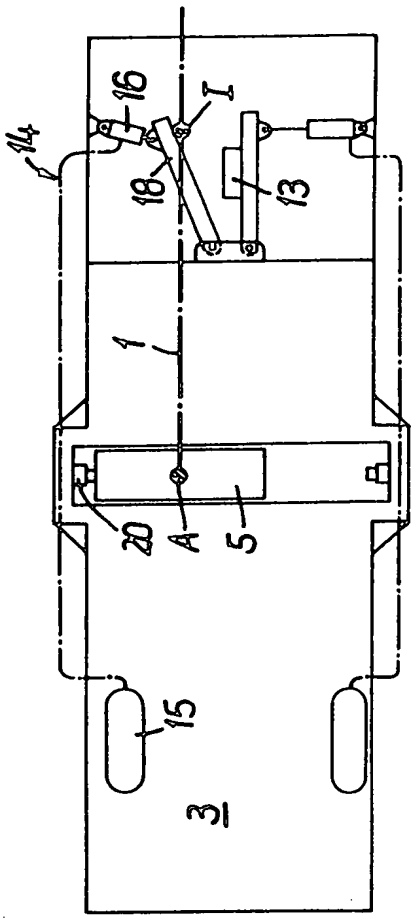

FIG. 5

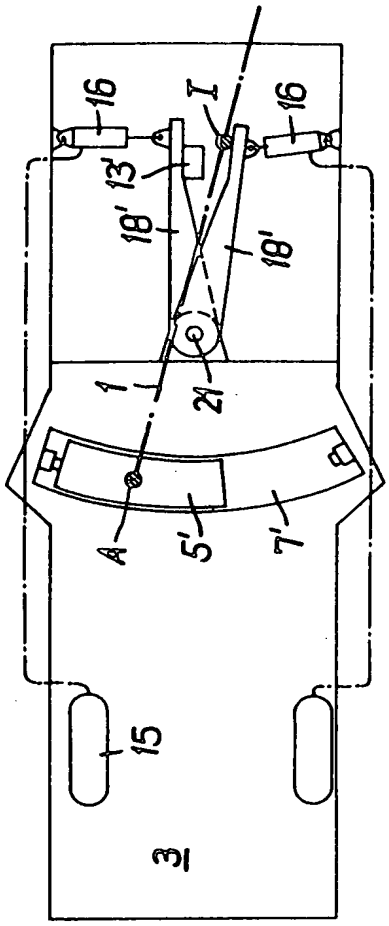

FIG. 6